

VISUALLY DETERMINED LONG-AXIS AND SHORT-AXIS PARASTERNAL VIEWS AND FOUR CHAMBER AND TWO CHAMBER APICAL VIEWS DO NOT REPRESENT PAIRED ORTHOGONAL PROJECTIONS.

Alan S. Katz, M.D., Donald C. Wallerson, M.D., Riccardo Pini, M.D., Richard B. Devereux, M.D., F.A.C.C. Cornell Medical Center, New York, N.Y.

The long-axis and short-axis views in the parasternal window (PW) and the 4- and 2-chamber views in the apical window (AW) respectively, are considered to be orthogonal to each other. We tested the validity of this assumption in a series of clinical studies performed by an experienced echocardiographer. Two custom designed 3.5MHz transducers with an electric motor that rotated the transducer in 64 or 62 equal increments totaling 180° about a central axis were used. Images were acquired by beginning at the best appearing long-axis parasternal or apical 4-chamber views and then rotating blindly in equal increments to the best appearing short-axis or apical 2-chamber views. Imaging was attempted in 25 patients (age 21 to 89, mean 44) referred for echocardiography. Thirty-five PW and 23 AW recordings were adequate for analysis. On several patients 2 rotations were recorded from the same window. The difference between "orthogonal" views in degrees of rotation were:

| Window | Mean Rotation | Minimum | Maximum | Std. Deviation |
|--------|---------------|---------|---------|----------------|
| PW | 98° | 64° | 156° | 19° |
| AW | 93° | 30° | 136° | 22° |

Deviations exceeded 20° in 18/60 (30%) and 30° in 10/60 (17%) of paired views.

Thus, on average the assumption of orthogonality between the long- and short-axis views in the PW and between the 4- and 2-chamber views in the AW is correct but there is wide deviation from this principle in individual patients. These deviations limit the accuracy of 2-D echo measurements and especially calculation of chamber volumes and mass by methods that assume orthogonality of projections.

IDENTIFICATION OF THE LEFT VENTRICULAR ENDOCARDIUM BY MEANS OF A LEFT HEART ECHOCARDIOGRAPHIC CONTRAST AGENT (SHU 508)

Michael Schartl, M.D., Siebert J*, Fritsch Th*

Dept. of Cardiology UKRV/Charlottenburg, Berlin, Schering AG Berlin*

We attempted to determine whether administration of SHU 508, a transpulmonary echocardiographic contrast agent, aids in identification of the left ventricular endocardium. SHU 508 consists of microparticles (99 % <8 µm) with stabilized gasbubbles (97 % <8 µm) adhering to the surface. The microparticles dissolve very rapidly after i.v. injection and the air bubbles are capable of crossing the pulmonary bed. Administration of the left heart contrast medium permits homogeneous opacification of the left heart with clear identification of the endocardial border. However, the contrast agent makes it more difficult to determine the endocardial border if the endocardium can be identified very well in the image without contrast. To overcome these problems we used digital image processing techniques (Mipron System Kontron). We subtracted four uncontrasted images from four contrast images in order to generate the final image. This new image allows optimal measurement of ejection fraction even in cases with poor precontrast outlining. The advantage of digital image processing lies in reduced interobserver variability (95% confidence interval without contrast 10%, with contrast 12%, digital image 5%). Preliminary evaluation suggests that automatic edge detection provides better results when subtracted images are used for identification of the endocardial border.

ACUTE CHANGES IN LEFT VENTRICULAR ACCELERATION TIME ARE CAUSED BY AFTERLOAD REDUCTION, WITHOUT IMPROVED CONTRACTILITY, IN HEART FAILURE PATIENTS

Michele A. Hamilton M.D., Lynne W. Stevenson M.D., F.A.C.C., John S. Child M.D., F.A.C.C., UCLA School of Medicine, Los Angeles, CA.

Controversy exists regarding the effects of contractility and afterload on left ventricular outflow Doppler patterns. LV outflow tract pulsed Doppler recordings and 2-D echo were performed in 27 patients with advanced heart failure (ejection fraction 16±3%) before and after 3±1 days of vigorous vasodilator and diuretic therapy. Systemic vascular resistance decreased from 1697±422 to 1029±284d-s-cm⁵, pulmonary wedge pressure decreased from 31±6 to 19±6 mmHg, and cardiac output increased from 3.4±1.0 to 5.3±1.2 L/min (p<.01). LV acceleration time (AT) increased in 24/27 pts (89%) after therapy (*=p<.01), but there was no significant change in ejection time, mean acceleration (ACC), or peak systolic pressure/end systolic volume index (PSP/ESVI):

| | AT (ms) | Ejection Time (ms) | PSP/ESVI (mmHg-m ³ /cc) | ACC (m/s ²) |
|------|------------|-----------------------|---------------------------------------|----------------------------|
| Pre | 90±14 | 220±37 | 1.3±0.5 | 7.9±2.7 |
| Post | 102±14* | 230±29 | 1.3±0.7 | 7.7±2.1 |

Since LV outflow tract acceleration time increases with afterload-reduction therapy without changes in indices of contractility, it appears to be an afterload-dependent parameter which may be useful for monitoring response to therapy in patients with heart failure.

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Valvular Disease

Assessment of Mitral Valve Prolapse by Transesophageal Echocardiography.

Pascal GUERET, MD, FACC, Philippe Lacroix, MD, Julien Bensaid, MD.

University of Limoges. France.

The diagnostic value of transesophageal echocardiography (TEE) in mitral valve prolapse (MVP) and its complications is not well established. To this aim, 32 consecutive patients (21 male, 11 female, mean age 40 ± 26 y.) with known or clinically suspected MVP (mid to late systolic click and/or systolic murmur) were studied by transthoracic echocardiography (TTE) and TEE. The following echo features were documented by TTE and TEE respectively : significant systolic bowing of mitral leaflet into left atrium 20/32 pts vs 31/32 pts (<0.001) (posterior leaflet 9/32 vs 12/32, anterior leaflet 4/32 vs 6/3, both leaflets 7/32 vs 13/32) ; excessive posterior coaptation of mitral leaflets 9/32 vs 24/32 (p < 0.001) ; abnormal leaflet thickness (>5 mm) 17/32 vs 28/32 (p < 0.01) ; ruptured chordae tendinae (flail mitral leaflet) 5/32 vs 12/32 (p < 0.05). No disagreement was noted between TTE and TEE concerning presence and direction of mitral regurgitation (30/32 pts). In conclusion, due to its higher diagnostic potential for mitral valve prolapse and its complications, mainly ruptured chordae tendinae, transesophageal echocardiography may be a valuable adjunct to standard transthoracic echocardiography in selected patients.